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ABSTRACT

Noting that the public's discussion, and most of what has appeared in educationist publications for teachers' discussion, is silent about the practicality of what reasoning is and how to teach it, this paper presents several examples taken from the National Assessment of Educational Progress' (NAEP) "Literacy: Profiles of America's Young Adults" to illustrate the depth of the literacy problem and makes recommendations as to which reasoning abilities are needed for functional literacy. The paper presents four higher reasoning skills and one classroom activity for each: (1) synthesis or summary; (2) analysis or problem solving; (3) argumentation; and (4) experimentation. The paper concludes that it is beginning to become apparent that the nationwide tests which reveal students' inabilities to invoke higher reasoning skills rest upon educators' not knowing what those higher skills are and how to put them into the classroom. (RS)

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# Literacy and Critical Thinking:

# The NAEP Literacy Studies and What We Are Not Teaching About 'Higher Reasoning Skills'

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**Introduction.** One hundred years ago, 'literacy' meant ability to sign one's name, perhaps read a newspaper or the Bible, perhaps ability to do simple arithmetic. But that standard is no longer practical - it is not adequate for the average person in our current society. Most jobs, most personal financial and information-interpreting needs, and most community and family problems require a higher standard. In order to address this realization of the changeability of the idea, the National Assessment of Education Progress (NAEP) defines 'literacy' more generically, as "using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential".[1] If we consider this definition, what can be said about literacy at the present time in the United States ? The most recent evidence gathered by NAEP is encouraging at the lowest or fundamentals levels of that definition, but becomes frightening beyond that. Testing 9, 13 and 17-year olds over an 18 year period,[2] indications are that basic and simple knowledge such as word recognition, addition and subtraction, beginning scientific concepts and ability to match a single-item question to an identical phrase in a given paragraph, are skills now attained by 80-95% of those tested, by the time they leave high school and enter the work force, college, marriage and citizenship. By nineteenth century standards, such news would have to be interpreted as good; and the improvement we see be-

tween the early 1970's and the late '80s is considerable, indicating that efforts to reform education and restore fundamentals have taken hold and produced significant results at this rock-bottom level.

What is frightening is that 11th graders, and a large sample of young American adults ages 21-25, cannot *use* these isolated bits of knowledge and simple skills by connecting them up one to another in trains of reasoning, or make analyses of a problem to lead them to steps they could do to reach a solution. They are not able to summarize a passage in their own words; they cannot build an argument for or against an action even if it is something familiar to them in their daily lives; they cannot imagine what kind of information they would need to look for in order to solve a problem. In real terms they are not able to reason in practical ways directly necessary to life today. It is not that the gene pool of the people of the United States has taken a radical downturn such that the largest percentage of the American people have sub-human I.Q.'s. Rather, it is that these 'higher skills' are not being identified as part of education's agenda, and therefore they are not being nurtured.

Consequently these young adults are intellectually passive and dependent: if they are presented with a structured question already containing one best answer, they can find it; if they are asked to describe one feature of a bar graph, they can do it; if they are asked to solve a problem having one step, they do it easily. But when presented with a need to think, in any of the higher, more active senses mentioned above, their scores drop

down to high 30- or low-40 percentiles. Thus in terms of the kinds of jobs our economy will need to invent and fill if we are to have even a slightly-good, above-poverty kind of life for our people, and the skills needed to navigate one's way through the confusing waters of information overkill in order to find what one needs, and use that information to 'connect the dots', to make sense out of work, and of self in family and community life, we are raising a generation of reasoning failures, people who can not and will not be able to function at this standard of literacy. The consequences for the economy and for the institutions that define a free people in a republican democracy, not to speak of the consequences for individual fulfillment of one's human potentiality, are awesomely negative.

Some of this story has been told by news reports, television specials and newspaper excerpts from NAEP documents. But what has not been discussed, by NAEP or by those reporting its findings is just what this problem due to the real change in the meaning of "functional literacy" has to do with critical thinking or informal logic. The reports are full of enticing references to skills of reasoning or the ability to "process" information; but nowhere do we find any concrete explanation of what these skills are or what is meant by information "processing". And since the public's discussion, and most of what has appeared in educationist publications for teachers' discussion, is silent about the practicality of what reasoning is and how to teach it, we should not be surprised to find that there are no recommendations as to what reasoning abilities are needed for functional

literacy, what curricular reforms would address the lack of these skills, and how we should get started teaching and nurturing them from kindergarten through to graduate studies.

What I would like to try, then, is <first> to present several examples taken from the NAEP's Literacy: Profiles of America's Young Adults, in order to illustrate what is meant, and then <second> make concrete what is otherwise only abstract about their call for more work on higher reasoning skills.

To indicate the depth of the problem, I shall choose one example of low performance, to give a sort of bench-mark of what we are talking about, and then one illustrating what is m meant by 'higher levels', from **each** of the three areas studied - (1) *prose literacy* (written information, ranging from poems to editorials), (2) *document literacy* (use of job applications, bus schedules, maps, indexes, etc.), and (3) *quantitative literacy* (checkbooks, figuring a tip, interest on a credit purchase, etc.).

(1) **Prose literacy:** When presented with a 140-word news story about a young lady who swam three 28-mile "laps" around Manhattan island - in which the 3rd paragraph explains that she kept up her strength by eating banana and honey sandwiches, hot chocolate, water and granola bars - 96% of the young adults were able successfully to underline the passage that explained how she kept up her energy. This ability is called "single-feature match", since only one item is sought and the question itself contains the same phrase as the news story - here, the phrase "...kept up her strength...".

However, to illustrate what would count as a higher level of reading and interpreting information of this kind, when presented with a Tom Wicker column about what the Reagan administration knew during Korean Air Lines Flight 007's movement into Soviet airspace, only 37% were able to synthesize the main point of the column by bringing together the story's three main points into one paraphrase. And, getting even worse, when presented with a 17-word poem by Emily Dickinson, only 9% could say in their own words what the poet was trying to express.

(2) **Document literacy:** When presented with an 8-item shopping list and a photocopy of a daily newspaper ad containing prices and discount coupons, 96% were able to match items on the shopping list to the money-saving coupons. (There were coupons for 4 of the 8 items). But then these young adults were presented with a bus schedule and given this problem: suppose that you were traveling on a Saturday, in the afternoon, missed the 2:35 p.m. bus, are leaving from the Hancock/Buena Ventura bus stop, and are going to the Flintridge/Academy stop; how long must you wait for the next bus ? The results were shocking - only 20% of the young adults were able to see that the next bus in the appropriate column was at 3:05 p.m.

Finally, (3) concerning **Quantitative literacy:** 92% were able to total two items on a bank deposit slip, one for $300 and for $57.23, to get the right answer. But when presented with a photocopy of a lunch menu and told they had $3.00 to spend, only

38% could determine what change they would get back by ordering a particular ($1.95) sandwich and soup ($0.60), and how much money they should leave for a 10% tip.

One observation that needs to be made is that the results are the same whether the reasoning ability needed was quantitative or verbal, and whether it was related to a prose narrative account or to some type of form or printed information common to our current society - it is not as if we are doing well with verbal ability and only poorly with quantitative.

What was 'higher' in case (1) ? In that case it was the ability to summarize, to pull out from the words something that was not already provided, - one would have to separate major items from minor ones, and use the original's words mixed with or replaced by one's own to give a brief synopsis of the item which hits all the bases. Call it induction, generalization, interpretation or synthesis, this power of the mind to grasp the whole, to see how all these trees make this forest, can not be done without, or be replaced by what we called earlier the lowest, basic and fundamental ability to spot particular words or isolated phrases.

What was 'higher' in case (2) ? Here the bus schedule 'contained' hundreds of answers; the question, therefore, was a problem: how does one read a table or schedule or program in order to make use of it? The problem was composed of variables - am or pm, inbound or outbound, different bus-stop names, and a time on one of these; without keeping each of these variables in mind, and organizing them into some order of approach, and then

doing the first in order to do the second in order to do the third, one could not each which of the many answers was 'the' answer needed in this case. The schedule was there, in some sense it could be 'read' by 21-25 year old Americans, but is was useless for practical purposes.

What was 'higher' in case (3)? Here too it was a problem - one had to structure an approach in one's mind, as to what to do with the information. No new information was needed, here, not even from common experience we might have taken for granted. One needed to be able to add two numbers together, know which two numbers they were, and then know what 'ten percent' means and how that is to be figured, and then figure it - two calculations, each dependent on bringing to the problem something that was not stated in it, and taking up this or that item of information to try out possible angles until getting something that works right.

Time does not permit me to present other examples, but I think I can generalize from those unquoted examples as follows: other higher skills missing in the working minds of these young Americans are (1) the ability to take from well-known experiences and common words what could count as reasons for a conclusion, and to assemble them into some sort of case which would support or rebut that conclusion - we call this 'argumentation' ; and (2) the ability to invent a story or to 'suppose', to suggest a 'what if', a possible set of circumstances under which, if it were presented, invented or undertaken, then something would either emerge or not emerge, be tested as true or false, be found to

work or to fail - what we might call the skill of constructing an experiment, or at least imagining what might work as an experiment.[3]

I mentioned that these young adults are intellectually passive. This is meant to emphasize both parts of what has been said so far - <1> they depend on the test-maker or -presenter to structure the situation such that they can perform the one move they have been shown how to perform; if there is no set routine, if there is no clear cut matchup between what is given and what is wanted, they do not do it. And <2> in the other part, one can see that though they have certain skills and knowledge in isolation, as it were, they cannot USE them - by hooking one skill to another, one word or idea to another, the givens together with the unknown in order to see what is missing or what might be done to look for it. These are uses of the mind, uses of information, of skills, that require initiative, trial and error - and which seem to me to depend on the one with which we started - the ability to intuit or grasp a summary sense of the whole. What is the problem or passage all about anyway? If there were a summary or an answer, what would it look like? On one's reply to that question - whether it was asked by another or by oneself - the remainder of one's reasoning abilities depends: one's placement of given items, the setting up of moves to be made with known skills in what order, or the experimental making of moves toward unknowns.

This is not the place to draw out a detailed discussion about the psychological and social implications of these findings - it seems obvious that if schools are producing this sort of behavior, one ought not to be surprised that young people often find school boring or irrelevant to what they think is the real world - since most of us would agree that the real world does not present itself to us a sufficiently orderly manner as to let us make the main moves of our lives passively via lower-order skills and knowledge. But we had to get the schools up to where they are now, at least teaching the basics or rudiments of counting, addition, simple spelling and single-item matchups, in order for them, and for educators, to be able to go on. One could speculate on what might be the relationships between this sort of schooling and drug use, suicides, early pregnancies, and gratuitous violence done by young people - not to mention the obvious ties to creeping dysfunction of the economy, inability of the military to accept many recruits, decreasing citizenship and voting, rise of gangs, rise of direct and indirect costs to the public for all of the above, and the increasing, and therefore unprofitable and noncompetitive amounts of expenditures by the private sector to train new hires to read and write in order to be able to use them on the job.

As I said, this is not the place to address those questions, but I think we need to remember they are not far off in the wings. And they may become harder to keep in the wings. As educators we need here to concentrate some attention on what is to be done by us in our invention of curricula that could begin

to introduce activities that would call for, and then nurture the first beginning signs of, our students' use of abilities in these areas. Hurriedly, then, to conclude, let me present the six reasoning skills I have mentioned so far, and mention at least one activity that might be tried to begin to put them into one's teaching:

<1> Synthesis or summary: this needs to be taken out of the realm of the arbitrary, and out of the closet of being taken for granted. The task must be to build from short simple examples with a given type of material, upwardly to more complicated ones, calling for students to combine some of their own words with some of the original writer's or speaker's, in order to present, say, 3-line summaries to be discussed in class as to completeness, fairness, extent of hitting what were the basics and omitting none.

<2> Analysis or problem-solving: one aspect of this is the combining of items of information already available, but not yet combined; the other aspect is bringing in more than one skill, figuring out which one to being in first, and which second or third, and finally, how to go back and forth between these two, first picking two or more items to be used, with what skill, then that answer, perhaps, with some other original items, and what is to be done with this new pair, b by what skill. Examples range from math or detective stories, from historical accounts of an event to biological processes - but they would all have this patter, of complexity, calling for putting together some information items by way of some one skill, getting something, and put-

ting that together with something else by way of some different skill, or order to solve a complex, 2- or 4-step process.rather than only the 1-step processes at which our students are already proven masters.

<3>Argumentation: any student, at any age, in any subject matter, can handle some level of the question, 'why?' They tend, if left alone, to raise questions like that anyway, at least until it is bashed out of them. What needs to be shown is that argumentation is the giving of reasons for why, telling why one feels this way or that, reads or interprets, chooses or approves or is repulsed, by this or that. The range of subjects, at this point, is infinite and irrelevant. What is vital is to begin, as soon as we can, to provide students with the idea of building their own arguments, using what they have already, and, if and as they find that the occasion has presented itself, going off to other people, to books or labs or nature or family or wherever to get more information that is needed to finish up the case. Presenting, sharing, evaluating and comparing these products 3enables students to find, and be shown reasons why and just how, some of these arguments will do a given job better than others, that they are not all equally well-made, so that there are goals to work for, qualities to want to work in to one's making of one's arguments so that they will hold up relatively well, and leak less than they would if not given that work.

<4>Experimentation: This may or may not be made to tie in with what has been said and done above. The essence of it, s a reasoning skill, is to face a problem-solving situation where

at least one item of information is not given and is not in common stock among the class, or the public. Thus, something has to be found out - thus raising the question of relevance, what kind of thing would it be? That in turn leads to where or how it might be dug up or winkled out of nature by some kind of imagination, some proposed way of slicing the pie, making a run on some area of investigation such that what came out of it could be the kind of thing we seek. Clearly, different students may very well come up with different proposals as to how to do this, what experiment might work. It is usually important here to be sure to choose issues or topics where such variety can occur, so that it will not be thought that there is one and only one way to do it, the teacher knows what that is, and we are supposed to find it out. Far more helpful, and closer to reality and to practicality, if they find out that several experimental approaches had merits, the merits were not literally the same, and that those merits can be identified, discussed, and used as bases for combining more than one experimental approach to solving the same unknown. |The life of reason may be celebrated often by Nobel Prizes to individuals or small teams, but both in sciences and scholarship in general and in the wider world of human affairs, it is a life of interdependency and often or reciprocity. It is not helpful, and except for the most formalized or canned materials, it is not accurately reflecting reality, to teach reasoning as if it were a private affair one either does right or

does not know how to do, alone. Reasons are by nature shareable, they are meant to be given out, they are not lost by being given to others.

This has only been a sketch. We need to be alarmed at the evidence of the lack of higher reasoning skills and of certain kinds of information among the young people of our country. We need to be alarmed at our own complicity in having built a K-G system that has taken them in at early childhood and put them out into adulthood feeling and acting as if passivity and dependence were their lot, due to reasons literally, as well as metaphorically, beyond their control, because beyond their schooling. It is beginning to become apparent that the nationwide tests which reveal these disabilities and lacks of literacy rest upon lack of 'we grownups' knowing what those higher skills are, or , maybe more charitably, lack of knowing what to call them and how to put them into the classroom. It is as if three generations of teachers and professors had believed that these things all take care of themselves. By now we see that they do not; like the atmosphere, they are needed to live and they can be destroyed by neglect of the conditions under which they can be. Here I have tried to identify some of these vitally needed higher skills and to suggest what might be undertaken to begin to re-introduce them into the lives of young people, and thereby into the life of the country.

FOOTNOTES

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1. Irwin S. Kirsh and Ann Jungeblut, *Literacy: Profiles of America's Young Adults* (Princeton; National Assessment of Education Progress, 1986), pg. 3.

2. *Crossroads in American Education. A Summary of Findings.* Report No: 17-OV-01, February 1989. Princeton: ETS.

3. See *Crossroads....*, infra., for examples and some slight amount of discussion.